



UNIVERSITI PUTRA MALAYSIA

**THE EFFECTS OF DAY/NIGHT FORCING TEMPERATURE REGIMES,
GROWTH RETARDANTS AND ETHEPHON TREATMENTS ON
TULIPS (TULIPA GESNERIANA VAR 'CASSINI')**

WONG CHEE CHING.

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GROWTH RETARDANTS AND ETHEPHON TREATMENTS ON TULIPS
(*Tulipa gesneriana* var 'Cassini')**

By

WONG CHEE CHING

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirements for the Degree of Master of Agricultural
Science**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of the Master of Agricultural Science

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GROWTH RETARDANTS AND ETHEPHON TREATMENTS ON TULIPS
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June 2004

Chairman : Associate Professor Thohirah Lee Abdullah, PhD

Faculty : Agriculture

Three studies were conducted to determine the forcing procedures for potted tulip and postharvest treatments for cut tulips under tropical conditions.

The objectives of the first study were to examine the protein profiles alteration associated with various day/night forcing temperatures (26/22, 26/18, 26/14, 22/18, 22/14 and 18/14 °C) and to identify a potential protein marker that is involved in producing a good quality tulip through the SDS-PAGE method. The experimental design used was an incomplete block design with three replications per treatment. There were no significant differences in plant height, perianth length, flower diameter, no. of days to first visible bud and no. of days to senescence for plants treated under different day/night temperature regimes. Only scape length, no. of days to coloured bud stage and anthesis stage were significantly affected. Protein profiles obtained from one dimensional gel electrophoresis from plants forced under different day/night temperatures showed no differences in protein banding patterns. Protein no. 2 at vegetative stage and protein no. 37 and 38 at anthesis stage were found to

have potential as protein markers that could be involved in producing good quality tulip which was revealed in 2D gel electrophoresis.

Second study was carried out in order to determine the optimal concentration of paclobutrazol and flurprimidol on height control of potted tulips. Two experiments were carried out by using two different growth retardants at different rates. In experiment I paclobutrazol at 0, 5, 10, 15, 20 and 25 mg.L⁻¹ were used while in experiment II flurprimidol was used at 0, 20, 40, 60, 80 and 100 mg.L⁻¹. The experimental design used was a completely randomised design with five replications per treatment. In experiment I, plant height and scape length, perianth length and flower diameter were significantly affected by paclobutrazol treatment. There were no significant differences in no. of days to first visible bud, no. of days to coloured bud stage, no. of days to anthesis and no. of days to senescence. The optimal rate of paclobutrazol for height control of 'Cassini' tulip was 20 mg.L⁻¹ with reduction of 13.6% in plant height and 14.8% in scape length. In experiment II, plant height, scape length, perianth and flower longevity were significantly affected by flurprimidol treatment. There were no significant differences in no. of days to first visible bud, no. of days to coloured bud stage, no. of days to anthesis and flower diameter. The optimal rate of flurprimidol in controlling plant height of 'Cassini' tulip was 40 mg/L with reduction of 13.8% and 17.4% for plant height and scape length respectively.

Third study was carried out to determine the effect of ethephon pretreatment on stem elongation and flower longevity of cut tulips. Treatments comprised basal stem dip in ethephon at 0, 20, 40 and 60 mg.L⁻¹ for 0, 15 and 30 minutes. The experimental

design used was a completely randomised design with five replications per treatment. Ethephon pretreatment significantly reduced the last internode length, scape length and flower opening rate. The reduction of stem length was due to the reduction in cell length which was revealed by histological study. Ethephon at 20 to 40 mg.L⁻¹ and duration of dipping time from 15 to 30 minutes were found to effective in overcoming the problem of stem elongation without reducing flower quality.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains Pertanian

**KESAN RAWATAN KOMBINASI SUHU SIANG/MALAM, BAHAN
PERENCAT TUMBESARAN DAN ETHEPHON TERHADAP TULIP**
(*Tulipa gesneriana* var 'Cassini')

Oleh

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June 2004

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Tiga kajian telah dijalankan untuk menentukan cara penanaman bunga tulip berpasu dan rawatan lepastuai untuk keratan bunga tulip di kawasan tropika.

Objektif kajian pertama adalah untuk mengkaji perubahan profil protein berkaitan dengan pelbagai suhu penanaman siang/malam (26/22, 26/18, 26/14, 22/18, 22/14 dan 18/14 °C) dan juga untuk mengenalpasti penanda protein yang berpotensi dalam penghasilan bunga tulip yang berkualiti melalui kaedah SDS-PAGE. Rekabentuk eksperimen yang digunakan adalah rekabentuk blok tidak lengkap dengan tiga replikasi untuk setiap rawatan. Tiada perbezaan yang bererti pada tinggi pokok, panjang perianth, diameter bunga dan bilangan hari untuk pengeluaran kudup pertama dan bilangan hari untuk senesen untuk pokok yang dirawat di bawah suhu siang/malam yang berbeza. Hanya panjang scape, bilangan hari untuk pewarnaan kudup dan antesis menunjukkan perbezaan yang bererti. Profil protein yang diperolehi dari gel elektroforesis satu dimensi untuk pokok yang ditanam pada suhu siang/malam yang berbeza tidak menunjukkan perbezaan yang bererti pada corak jalur protein. Protein no. 2 pada peringkat vegetatif dan protein no. 37 dan 38 pada

peringkat antesis didapati adalah penanda protein yang berpotensi untuk menghasilkan bunga tulip yang berkualiti yang ditunjukkan oleh gel elektroforesis dua dimensi.

Kajian kedua dijalankan untuk menentukan kadar paclobutrazol dan flurprimidol yang optimal untuk mengawal tinggi pokok berpasu. Dua eksperimen telah dijalankan dengan menggunakan dua jenis bahan perencat pertumbuhan yang berbeza pada kadar yang berlainan. Eksperimen pertama menggunakan paclobutrazol pada kadar 0, 5, 10, 15, 20 dan 25 mg.L⁻¹ manakala eksperimen kedua menggunakan flurprimidol pada kadar 0, 20, 40, 60, 80 dan 100 mg.L⁻¹. Rekabentuk eksperimen yang digunakan ialah rekabentuk penuh rawak dengan lima replikasi bagi setiap rawatan. Dalam eksperimen pertama, tinggi pokok, panjang scape, panjang perianth dan diameter bunga telah menunjukkan perbezaan yang bererti dengan rawatan paclobutrazol. Tiada perbezaan yang bererti untuk bilangan hari untuk pengeluaran kudup pertama, bilangan hari untuk antesis and bilangan hari untuk senesen. Kadar optima paclobutrazol untuk pengawalan tinggi pokok tulip 'Cassini' ialah 20 mg.L⁻¹ dengan pengurangan sebanyak 13.6% pada tinggi pokok dan 14.8% panjang scape. Untuk eksperimen kedua, tinggi pokok, panjang scape, panjang perianth dan jangka hayat bunga menunjukkan perbezaan yang bererti dengan rawatan flurprimidol. Tiada perbezaan yang bererti untuk bilangan hari untuk pengeluaran kudup pertama, bilangan hari untuk pewarnaan kudup, bilangan hari untuk antesis dan diameter bunga. Kadar optima flurprimidol untuk pengawalan tinggi pokok tulip 'Cassini' ialah 40 mg.L⁻¹ dengan pengurangan sebanyak 13.8% and 17.4% bagi tinggi pokok dan panjang scape masing-masing.

Kajian ketiga dijalankan untuk menentukan kesan pra-rawatan ethephon pada pemanjangan batang dan jangka hayat bunga keratan tulip. Rawatan terdiri daripada rendaman pangkal keratan ke dalam ethephon pada kadar 0, 20, 40 and 60 mg.L⁻¹ selama 0, 15 dan 30 minit. Rekabentuk eksperimen yang digunakan ialah rekabentuk penuh rawak dengan lima replikasi untuk setiap rawatan. Pra-rawatan ethephon yang digunakan didapati berkesan dalam pengurangan panjang internod terakhir, panjang scape dan kadar pembukaan bunga. Kepekatan ethephon pada kadar 20 hingga 40 mg.L⁻¹ dan jangka masa rendaman dari 15 hingga 30 minit didapati berkesan untuk mengatasi masalah pemanjangan tangkai bunga tanpa menjejaskan kualiti bunga tulip.

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I certify that an Examination Committee met on 15th June 2004 to conduct the final examination of Wong Chee Ching on his Master of Agricultural Science thesis entitled "Effects of Day/Night Forcing Temperature Regimes, Growth Retardants and Ethephon Treatments on Tulips (*Tulipa gesneriana* var 'Cassini') in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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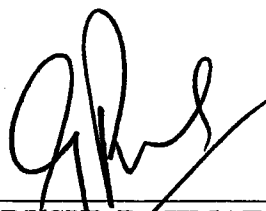
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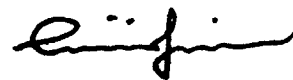
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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.



WONG CHEE CHING

Date : 10.09.2004

TABLE OF CONTENTS

	Page
ABSTRACT	ii
ABSTRAK	v
ACKNOWLEDGEMENTS	viii
APPROVAL	ix
DECLARATION FORM	xi
LIST OF TABLES	xvi
LIST OF FIGURES	xvii
 CHAPTER	
 I INTRODUCTION	1
 II LITERATURE REVIEW	5
Botanical Classification, Distribution and Description of Tulip	5
Developmental Cycle of Tulip	5
Major Factors Affecting Growth and Development of Tulip	6
Influence of Internal Factors	6
Influence of External Factors	7
Temperature Applied During the Bulb Storage	7
Effects of Temperature on Growth of Planted Bulbs	8
Influence of Light	9
Influence of Relative Humidity	11
Plant Growth Regulator	12
Paclobutrazol	12
Effects of Paclobutrazol on Plants	13
Flurprimidol	14
Effects of Flurprimidol on Plants	15
Ethylene	16
The Biosynthesis of Ethylene	16
Ethylene Releasing Agent	17
Effects of Ethylene on Plants	17
One Dimensional Protein Electrophoresis Separation: SDS PAGE	19
Two Dimensional (2-D) Electrophoresis	21
One and Two Dimensional Electrophoresis in Plant Biology	22
 III MATERIALS AND METHODS	24
Study I	
An Examination of Protein Profile, Growth and Flower Characteristics of Tulip under Different Forcing Temperature	24



Parameters Measured	26
Plant Height	26
Scape length	26
Perianth Length	27
Flower Diameter.	27
Number of Days to First Visible Bud	27
Number of Days to Coloured Bud Stage	27
Number of Days to Anthesis	29
Number of Days to Senescence	29
Protein Extraction with Phenol	29
One-Dimensional SDS Polyacrylamide Gel Electrophoresis	30
Two-Dimensional SDS Polyacrylamide Gel Electrophoresis	31
Experimental Design and Statistical Analysis	32
Study II	
Effects of Paclobutrazol and Flurprimidol on Growth and Flowering Characteristics of Tulip under Controlled Environment Chamber Conviron®	33
Parameters Measured	34
Plant Height	34
Scape length	34
Perianth Length	34
Flower Diameter	35
Number of Days to First Visible Bud	35
Number of Days to Coloured Bud Stage	35
Number of Days to Anthesis	35
Number of Days to Senescence	36
Experimental Design and Statistical Analysis	36
Study III	
Effects of Ethephon Pretreatment on Stem Elongation and Flower Longevity of Cut Tulips	37
Parameters Measured	38
Rate of Increase in First Internode	38
Rate of Increase in Last Internode	38
Rate of Increase in Stem Length	38
Rate of Increase in Perianth Length	39
Transpiration Rate	39
Rate of Flower Opening	39
Flower Longevity	39
Tepal Colour	40
Histological Study	40
Experimental Design and Statistical Analysis	41

IV	RESULTS AND DISCUSSION	42
	Study I	
	An Examination of Protein Profile, Growth and Flower Characteristics of Tulip under Different Forcing Temperature	42
	Plant Height and Scape Length	42
	Perianth Length and Flower Diameter	43
	Number of Days to First Visible Bud, Coloured Bud Stage and Anthesis	48
	Number of Days to Senescence	49
	Protein Profile for One Dimensional Gel Electrophoresis	49
	Two Dimensional Gel Electrophoresis	52
	Study II	
	II-A Effect of Paclobutrazol on the Growth and Flowering of 'Cassini' Tulips	70
	Plant Height	70
	Scape Length	71
	Perianth Length	73
	Flower Diameter	73
	Number of Days to First Visible Bud, Number of Days to Coloured Bud Stage and Number of Days to Anthesis	74
	Number of Days to Senescence	76
	II-B Effect of Flurprimidol on the Growth and Flowering of 'Cassini' Tulips	76
	Plant Height	76
	Scape Length	79
	Perianth Length	79
	Flower Diameter	80
	Number of Days to First Visible Bud, Number of Days to Coloured Bud Stage and Number of Days to Anthesis	80
	Number of Days to Senescence	81
	Study III	
	Effects of Ethephon Pretreatment on Stem Elongation and Flower Longevity of Cut Tulips	84
	Rate of Increase in First Internode Length	84
	Rate of Increase in Last Internode Length	84
	Rate of Increase in Stem Length	92
	Rate of Increase in Perianth Length	98
	Transpiration Rate	100
	Rate of Flower Opening	102
	Flower Longevity	105
	Tepal Colour	110
	Cellular Growth (Cell Length and Cell Width)	118

V	CONCLUSION	129
	REFERENCES	133
	APPENDICES	145
	BIODATA OF THE AUTHOR	167



LIST OF TABLES

Table	Page
1 Main and interaction effects of four levels of Ethephon concentrations (E), three dipping times (T) and six evaluation days (D) on rate of increase in first internode length (FI), rate of increase in last internode length (LI), rate of increase in stem length (SL), rate of increase in perianth length (PL), rate of flower opening (FD), and transpiration rate (TR) of cut tulips	85
2 Main and interaction effects of four levels of Ethephon concentrations (E), three dipping times (T) on flower longevity of cut tulips	107
3 Main and interaction effects of four levels of Ethephon concentrations (E), three dipping times (T) and six evaluation days (D) on tepal colour (L^* , C^* and h^0) of cut tulips	111
4 Main and interaction effects of four levels of Ethephon concentrations (E), three dipping times (T) on the cell length and width of the last internode of cut tulips	120



LIST OF FIGURES

Figure		Page
1	<i>Tulipa gesneriana</i> 'Cassini'	25
2	Schematic diagram illustrating the terminology used in the text	28
3A&3B	Effect of different day/night temperature regimes on vegetative growth and flowering of 'Cassini' tulip. Figure 3A and 3B indicated tulips forced at 26/22 and 26/18 °C day/night temperatures, respectively	44
3C&3D	Effect of different day/night temperature regimes on vegetative growth and flowering of 'Cassini' tulip. Figure 3C and 3D indicated tulips forced at 26/14 and 22/18 °C day/night temperatures, respectively	45
3E&3F	Effect of different day/night temperature regimes on vegetative growth and flowering of 'Cassini' tulip. Figure 3E and 3F indicated tulips forced at 22/14 and 18/14°C day/night temperatures, respectively	46
4	Effects of different day/night temperature regimes on plant height, scape length, perianth length and flower diameter of 'Cassini' tulip. Mean separation is by DMRT at $P_{0.05}$	47
5	Effects of different day/night temperature regimes on number of days to first visible bud, coloured bud stage, anthesis and senescence of 'Cassini' tulip. Means followed by the same letter are not significantly different by DMRT at $P_{0.05}$	50
6	Protein profile of 'Cassini' tulip forced under different day/night temperature regimes. Mid-range molecular weight standards (Lane M); Bulbs collected at planting stage (Lane P0); Bulbs collected at first week after planting (Lane V1 to V6 indicated plants forced at 26/22, 26/18, 26/14, 22/18, 22/14 and 18/14 °C respectively); Bulbs collected at anthesis stage (Lane A7 to A12 indicated plants forced at 26/22, 26/18, 26/14, 22/18, 22/14 and 18/14 °C respectively). Major visible bands were of molecular weight of 66.2 and 31.0 KDa	51



- 7A Protein profile of 'Cassini' tulip forced under different day/night temperature regimes. Mid-range molecular weight standards (Lane M); Bulbs collected at planting stage (Lane P0); Bulbs collected at first week after planting (Lanes V1 to V6 indicated plants forced at 26/22, 26/18, 26/14, 22/18, 22/14 and 18/14 °C respectively); Bulbs collected at anthesis stage (Lane A7 to A12 indicated plants forced at 26/22, 26/18, 26/14, 22/18, 22/14 and 18/14 °C respectively). Major visible bands were of molecular weight of 66.2 and 31.0 Kda 53
- 7B 2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at vegetative stage. Figure 7B indicated plants forced at 22/18 °C. First dimension: IEF at pH 3-10NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5 µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. There were 117 protein spots detected here 55
- 7C 2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at vegetative stage. Figure 7C indicated plants forced at 26/22 °C. First dimension: IEF at pH 3-10 NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5 µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. A total of 16 novel proteins (1a to 1p) were detected and about 22 proteins were found to have disappeared (2, 14, 15, 16, 17, 31, 38, 41, 47, 48, 56, 59, 60, 51, 65, 66, 70, 71, 72, 73, 75 and 76) 56
- 7D 2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at vegetative stage. Figure 7D indicated plants forced 26/18 °C. First dimension: IEF at pH 3-10 NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5 µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. No novel proteins were detected but 33 protein spots were found to have disappeared (2,11, 14, 15, 16, 17, 25, 28, 31, 34, 35, 36, 37, 38, 39, 41, 42, 43, 44, 45, 47, 48, 56, 59, 60, 70, 71, 72, 73, 76, 79, 83 and 114). So, the total number of proteins detected was 84 58

- 7E 2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at vegetative stage. Figure 7E indicated plants forced at 26/14 °C. First dimension: IEF at pH 3-10NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5 µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. A total number of 107 proteins were detected. There were 5 novel proteins and 15 proteins had disappeared (2, 9, 11, 25, 26, 27, 28, 40, 56, 57, 58, 102, 103, 105 and 114) 59
- 7F 2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at vegetative stage. Figure 7F indicated plants forced at 22/14 °C. First dimension: IEF at pH 3-10NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5 µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. A Total number of proteins detected were 112. Eight novel proteins and 11 proteins were disappeared (2, 22, 23, 32, 46, 47, 53, 54, 70, 71 and 79) 60
- 7G 2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at vegetative stage. Figure 7G indicated plants forced at 18/14 °C. First dimension: IEF at pH 3-10NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5 µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. The total number of proteins detected were 102. At this forcing temperature, 6 novel proteins were detected and number of proteins that disappeared were 21 (2, 35, 37, 42, 43, 44, 45, 46, 65, 77, 82, 83, 84, 86, 87, 88, 104, 106, 107, 114 and 115) 61

- 7H 2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at anthesis stage. Figure 7H indicated plants forced at 22/18 °C. First dimension: IEF at pH 3-10NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5 µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. The total number of proteins detected at anthesis was 89 63
- 7I 2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at anthesis stage. Figure 7I indicated plants forced at 26/22 °C. First dimension: IEF at pH 3-10 NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5 µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. There were 72 proteins detected. However, 26 proteins were found to have disappeared (3, 4, 5, 8, 15, 16, 17, 18, 19, 22, 25, 26, 27, 28, 29, 30, 36, 37, 38, 48, 55, 56, 57, 58, 61 and 71) and ten novel proteins were detected at this forcing temperature 64
- 7J 2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at anthesis stage. Figure 7J indicated plants forced at 26/18 °C. First dimension: IEF at pH 3-10 NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5 µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. Only 70 proteins were detected and 23 protein spots disappeared (3, 4, 5, 15, 18, 19, 25, 26, 27, 34, 36, 37, 38, 41, 42, 50, 55, 56, 57, 58, 60, 68 and 69). Four novel proteins were detected here as shown by their protein profile 65
- 7K 2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at anthesis stage. Figure 7K indicated plants forced at 26/14 °C. First dimension: IEF at pH 3-10NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5 µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. Only 3 novel proteins were detected and 12 proteins were found to

	have disappeared here (14, 18, 19, 22, 23, 35, 37, 38, 50, 51, 53 and 59)	66
7L	2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at anthesis stage. Figure 7L indicated plants forced at 22/14 °C. First dimension: IEF at pH 3-10 NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. The total number of proteins detected was 83. Protein spots that disappeared were 3, 4, 16, 17, 32, 37, 38, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 70, 71, 78, 79, 80, 81, 85, 86 and 88. The number of novel proteins detected here was 28	67
7M	2-D IEF/SDS-PAGE patterns of 'Cassini' tulip from bulb scale at anthesis stage. Figure 7M indicated plants forced at 18/14 °C. First dimension: IEF at pH 3-10 NL using IPG gel strips (11 cm), left to right. Second dimension: SDS-PAGE, top to bottom, gradient gel concentration (8-18%). Approximately 5µg/gel protein content was loaded onto the first dimension. The major SDS-bands are indicated. The gel was stained with silver nitrate. Mr: Broad molecular weight markers. The broad range pI scale was located at the bottom of the gel. 76 proteins were detected and the number of proteins that had disappeared were 35 (3, 4, 15, 25, 26, 35, 36, 37, 38, 41, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 78, 82 and 86). A total of 22 novel proteins were detected at this forcing temperature	68
8	Effect of paclobutrazol on the vegetative growth and flowering of 'Cassini' tulip (P0= Control, P1=5 mg.L ⁻¹ , P2= 10 mg.L ⁻¹ , P3= 15 mg.L ⁻¹ , P4= 20 mg.L ⁻¹ & P5= 25 mg.L ⁻¹) Plant height was significantly reduced by paclobutrazol treatments	72
9	Effects of paclobutrazol on plant height, scape length, perianth length and flower diameter of 'Cassini' tulip. Means followed by the same letter are not significantly different by DMRT at P _{0.05}	75
10	Effects of paclobutrazol on no. of days to first visible bud, coloured bud stage, no. of days to anthesis and no. of days to senescence of 'Cassini' tulip. Means followed by the same letter are not significantly different by DMRT at P _{0.05}	77

11	Effect of flurprimidol on the growth and flowering of 'Cassini' tulip (F0= 0 mg.L ⁻¹ , F1= 20 mg.L ⁻¹ , F2= 40 mg.L ⁻¹ , F3= 60 mg.L ⁻¹ , F4= 80 mg.L ⁻¹ , & F5=100 mg.L ⁻¹). Plant height was significantly reduced by flurprimidol treatments	78
12	Effects of flurprimidol on plant height, scape length, perianth length and flower diameter of 'Cassini' tulip. Mean separation is by DMRT at P _{0.05}	82
13	Effects of flurprimidol on number of days to first visible bud, coloured bud stage, anthesis and senescence of 'Cassini' tulip. Mean separation is by DMRT at P _{0.05}	83
14	Effect of ethephon pretreatment on stem elongation and flower longevity of cut tulips (C= Ethephon concentration, C0= 0 mg.L ⁻¹ , C1= 20 mg.L ⁻¹ , C2= 40 mg.L ⁻¹ & C3= 60 mg.L ⁻¹ ; D= Duration of dipping time; D0= 0 minute, D1= 15 minutes & D2= 30 minutes). Excessive postharvest flower stems elongation were observed for non-treated flowers compared to shorter flower stems and closure flower shape for treated flowers	86
15	Effect of ethephon concentration x duration of dipping time on rate of increase in last internode length of 'Cassini' tulip. Mean separation pertaining to each dipping time is by DMRT at P _{0.05}	87
16	Effect of ethephon concentration x evaluation day on rate of increase in last internode length of 'Cassini' tulip. Mean separation pertaining to each ethephon concentration is by DMRT at P _{0.05}	89
17	Effect of duration of dipping time X evaluation day on rate of increase in last internode length of 'Cassini' tulip. Means pertaining to each dipping time followed by the same letter are not significantly different by DMRT at P _{0.05}	91
18	Effect of ethephon concentration x duration of dipping time on rate of increase in stem length of 'Cassini' tulip. Mean separation pertaining to each dipping time is by DMRT at P _{0.05}	95
19	Effect of ethephon concentration X evaluation day on rate of increase in stem length of 'Cassini' tulip. Means pertaining to each ethephon concentration followed by the same letter are not significantly different by DMRT at P _{0.05}	96
20	Effect of duration of dipping time X evaluation day on rate of increase in stem length of 'Cassini' tulip. Means pertaining to each dipping time followed by the same letter are not significantly different by DMRT at P _{0.05}	97

21	Effect of duration of dipping time X evaluation day on rate of increase in perianth length of 'Cassini' tulip. Means pertaining to each dipping time followed by the same letter are not significantly different by DMRT at $P_{0.05}$	99
22	Effect of ethephon concentration x duration of dipping time on transpiration rate of 'Cassini' tulip. Mean separation pertaining to each dipping time is by DMRT at $P_{0.05}$	101
23	Effect of ethephon concentration X duration of dipping time on rate of flower opening of 'Cassini' tulip. Means pertaining to each dipping time followed by the same letter are not significantly different by DMRT at $P_{0.05}$	103
24	Effect of ethephon concentration x evaluation day on rate of flower opening of 'Cassini' tulip. Mean separation pertaining to each ethephon concentration is by DMRT at $P_{0.05}$	104
25	Effect of ethephon concentration x evaluation day on rate of flower opening of 'Cassini' tulip. Mean separation pertaining to each ethephon concentration is by DMRT at $P_{0.05}$	106
26	Effect of ethephon concentration X duration of dipping time on flower longevity of 'Cassini' tulip. Means pertaining to each dipping time followed by the same letter are not significantly different by DMRT at $P_{0.05}$	108
27	Effect duration of dipping time X evaluation day on L value of 'Cassini' tulip. Means pertaining to each dipping time followed by the same letter are not significantly different by DMRT at $P_{0.05}$	112
28	Effect of ethephon concentration X duration of dipping time on chromacity value of 'Cassini' tulip. Means pertaining to each dipping time followed by the same letter are not significantly different by DMRT at $P_{0.05}$	113
29	Effect of ethephon concentration X evaluation day on chromacity value of 'Cassini' tulip. Means pertaining to each ethephon concentration followed by the same letter are not significantly different by DMRT at $P_{0.05}$	116
30	Effect of duration of dipping time X evaluation day on chromacity value of 'Cassini' tulip. Means pertaining to each dipping time followed by the same letter are not significantly different by DMRT at $P_{0.05}$	117

- 31A Longitudinal sections of the last internode of the stem of the 'Cassini' tulip prior to ethephon treatment (40X magnification). More compacted and small cells were observed prior to ethephon treatment just after harvesting 121
- 31B&31C Figure 31B and 31C indicated internode treated with 0 mg.L⁻¹ of ethephon and 0 minute and 20 mg.L⁻¹ of ethephon and 0 minute of dipping time respectively. Due to the absence of the ethephon effect, all cell showed increased in cell length if compared to ethephon treated internodes 122
- 31D&31E Figure 31D and 31E indicated internode treated with 40 mg.L⁻¹ of ethephon and 0 minute of dipping time and 60 mg.L⁻¹ of ethephon and 0 minute of dipping time respectively. All cells showed increased in cell length without the ethephon treatment 123
- 31F&31G Figure 31F indicated internode treated with 0 mg.L⁻¹ of ethephon and 15 minutes of dipping time. Longer cell length was observed in all types of cells as observed in Figure 31B, 31C, 31D and 31E. Figure 31G indicated internode treated with 20 mg.L⁻¹ of ethephon and 15 minutes of dipping time. Due to the ethephon treatment effect, shorter cell length was observed if compared to non-treated internodes 124
- 31H&31I Figure 31H indicated internode treated with 40 mg.L⁻¹ of ethephon and 15 minutes of dipping time. Shorter cell length was observed if compared to figure 31G due to increased in ethephon concentration. Figure 31I indicated internode treated with 60 mg.L⁻¹ of ethephon and 15 minutes of dipping time. Shorter cell length was observed if compared to figure 31H with increased of ethephon concentration from 40 mg.L⁻¹ to 60 mg.L⁻¹ 125
- 31J&31K Figure 31J indicated internode treated with 0 mg.L⁻¹ of ethephon and 30 minutes of dipping time. Longer cell length was observed due to the absence of ethephon treatment. Figure 31K indicated internode treated with 20 mg.L⁻¹ and 30 minutes of dipping time. Shorter cell length was observed as compared to figure 31G, this was due to longer dipping time in the ethephon with the same concentration 126
- 31L&M Figure 31L indicated internode treated with 40 mg.L⁻¹ of ethephon and 30 minutes of dipping time. Shorter cell length was again observed if compared to non-treated internodes. Figure 31M indicated internode treated with 60 mg.L⁻¹ of ethephon and 30 minutes of dipping time. This is the highest ethephon concentration and longest dipping time. More compacted and shorter cells were observed if compared to the rest of the treatment 127

